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Pressure regulator for container for carbonated drink

The invention relates to a container for carbonated drink provided with a chamber containing the drink, a drink dispensing opening for drink from the chamber, a pressure medium chamber that is in fluid communication with the chamber for supplying pressure medium to the chamber, which pressure medium chamber has an outlet that is closed off by a delivery valve for delivering pressure medium and a pressure regulating element connected to the delivery valve for operating the delivery valve.

The invention also relates to a pressure regulating element and a method for filling a container with carbonated drink.

It is known to supply pressure medium, such as CO_2, to containers, such as metal containers containing whipped cream or cans of beer, by means of a CO_2 cartridge containing CO_2 under high pressure, such as 50 bar and higher. The volume of the CO_2 cartridge is relatively small and a large proportion of the CO_2 will escape on connecting if the connection is not made quickly and in a sealed manner. The seals for the high-pressure CO_2 cartridges and the pressure regulation thereof is relatively complex. Furthermore, with the known devices there is no facility for the user to set a regulating pressure.

A beer keg in which a pressure medium chamber is formed by a cavity in the keg is also disclosed in Gebrauchsmusterschrift DE 201 15 158 U1. A separate dispensing head that contains a pressure regulator can be connected by the user to a beer dispensing valve and to a CO_2 delivery valve. When the dispensing head is connected the pressure medium chamber is connected to the beer chamber in the keg. The pressure regulating element is not indicated in more detail.

Furthermore, a container for beer in which the beer is packed in a flexible bag, which bag is accommodated in a rigid plastic container, is disclosed in NL-A 1019054 in the name of the Applicant. The container is placed in a dispenser which is provided with a compressor that is connected to the container to build up pressure in the space between the flexible bag and the rigid outer container. The use of a compressor in the dispenser makes this relatively complex, whilst the compressor can give rise to vibration and an increased noise level.

One aim of the present invention is to provide [lacuna] container for carbonated drink, from which the drink can be dispensed without the use of pressure means to be

connected separately, such as a compressor known from the state of the art or carbon dioxide gas cylinders.

A further aim of the invention is to supply a relatively simple pressure regulating element for a container for carbonated drink that is effective at relatively low pressure. It is also an aim of the invention to provide a pressure regulating element that can be mechanically connected to the container for carbonated drink in an efficient manner, in particular in a process for filling the container with carbonated drink, such as in a fill line for beer. A further aim of the invention is to provide a pressure regulating element that can be adjusted by the user.

To this end the container according to the invention is characterised in that the pressure regulating element has a housing with an end wall, a peripheral wall and a piston that can be moved in the housing along the peripheral wall in a sealed manner, wherein an upper housing part is formed between a side of the piston that faces the end wall and the end wall and a lower housing part that at least partially surrounds the delivery valve is formed at the side of the piston facing away from the end wall, wherein the piston engages on the delivery valve and wherein the upper housing part of the housing is in fluid communication with a reference pressure source.

The relatively simple pressure regulator according to the invention can be coupled to the pressure medium container in a simple manner. The pressure medium container can, for example, be connected to the container, for example by a wall of a top part, side part or bottom part. Preferably, however, the pressure medium container is accommodated in the chamber for carbonated drink. The pressure regulating element according to the invention is suitable for use at relatively low pressures, lower than 20 bar, preferably lower than 10 bar. Accurate pressure regulation of the carbon dioxide gas pressure in the chamber, at a few bar overpressure with respect to the reference, which, for example, is ambient pressure, is possible using the pressure regulating element according to the invention, without the use of complex gas seals.

In one embodiment a spring element is accommodated between the end wall of the housing of the pressure regulating element and the piston. As a result the delivery valve of the pressure medium chamber is pretensioned and the pressure regulating range of the pressure regulating element can be adjusted in a simple manner by setting the spring tension. In one embodiment the upper housing part of the pressure regulating element comprises a cylindrical wall with a screw thread and a cap that is joined to the cylindrical

wall by a complementary screw thread, wherein the volume of the upper housing part is variable by moving the cap along the cylindrical wall for setting the internal pressure in the container. By moving the cap the user can adapt a pressure regulating range in a simple manner and, if desired, a carbonated drink, such as beer can be tapped from the container under high pressure – with a great deal of frothing – or under low pressure, without much frothing.

The chamber of the container can be provided with an insertion opening for introducing the pressure medium chamber into the chamber, which insertion opening is provided with a connecting element, wherein the pressure regulating element has a complementary connecting element for fixing to the connecting element of the chamber. The chamber can be provided with an activating member, which engages on the pressure medium chamber when the regulator valve is fixed, as a result of which the delivery valve is pressed against the piston.

The pressure regulating element can make up a closure assembly with a drink dispensing valve and can be connected to the pressure medium container. After filling the container with drink, such as in a fill line for beer, the pressure medium container can be placed in the container through the fill opening in the latter and the fill opening can be closed off by connecting the closure assembly to the chamber, via, for example, a liquid-tight screw joint. For this purpose a tool is preferably used in the fill line to effect connection of the closure assembly to the container in such a way that this cannot be removed by a user.

After the closure assembly has been placed in the fill opening, the container is ready for use, for example, for placing in a drink dispenser as described in NL-A 1019054 in the name of the Applicant, it now being possible, however, to dispense with the compressor in the drink dispenser. After connecting a dispensing line to the drink dispensing opening, the contents of the container can be dispensed under the desired pressure.

According to a further embodiment of a container for carbonated drink the drink dispensing opening is closed off by a drink dispensing valve, which drink dispensing opening has been displaced with respect to the axis of the container, wherein a dispensing line is provided with an outflow section located transversely to the axis of the container and a section located in the direction of the axis of the container that engages on the outlet, wherein the distance from the axis of the drink dispensing opening is such that in an inactive position the outflow section is within a periphery of the container and in a

dispensing position turned with respect to the inactive position the outflow section protrudes beyond the periphery of the container.

When placing in the transport position, the drink dispensing line is turned about its vertical axis such that it is within the periphery of the container. The container can easily be transported and stored in this position without the risk of damage to the dispensing line. By rotating the drink dispensing line about its vertical axis, the drink dispensing line is positioned outside the periphery of the container, so that the drink can be dispensed therefrom into a glass placed next to the container. A suitable container for this embodiment is, for example, described in NL 1016688 in the name of the Applicant.

A few embodiments of a container for carbonated drink will be described in more detail by way of example, with reference to the appended drawing. In the drawing:

Fig. 1 shows a diagrammatic longitudinal section of a container and a pressure regulating element according to the invention,

Fig. 2 shows a detail of a closure assembly with a pressure regulating element and drink dispensing valve according to the invention,

Fig. 3 shows a closure assembly similar to that in Fig. 2, where the pressure regulating element has been made adjustable,

Fig. 4 shows a tool for fixing the closure assembly according to Fig. 2 and Fig. 3 to a container for carbonated drink, and

Fig. 5 shows a container for carbonated drink, where the drink dispensing line can be rotated about its vertical axis between a storage/transport position located within the periphery of the container and an operational position located outside the periphery of the container.

Fig. 1 shows a container for carbonated drink 1, such as beer, and as, for example, described in NL-A 1019054. The container can be made of metal or plastic and can be used in a dispenser as described in the abovementioned publication, it being possible, however, to dispense with the compressor for pressurising the container. In the container 1 there is a chamber 2 containing carbonated drink, preferably beer. In the top wall of the container 1 there is a fill opening 5 through which a pressure medium container 9 has been introduced into the chamber 2. A closure assembly 7 that is attached to the pressure medium container 9 has been fitted in the fill opening 5 after filling the chamber 2 and closes this off in a liquid-tight manner. The closure assembly 7 has a pressure regulating element 10, which engages on a valve 12 of the container 9, and a drink dispensing opening 13, which is

closed off by spring-loaded valve 11. The pressure regulating element 10 operates a shut-off valve 12 of the pressure medium container 9 via which pressure medium, preferably CO_2, is able to flow into the space 17 above the level of the beer. The pressure regulating element 10 has a piston 19 that engages on the shut-off valve 12 and that, via opening 21, is in communication with the pressurised space 17. The piston 19 is in communication with the surroundings via an opening 24.

A dispensing line 27 that is some distance away from the axis 29 of the container 1 has been placed in the drink dispensing opening 13. A riser 30 that is connected to the internal side of the dispensing opening 13, below the valve 11, is accommodated in the container 1. A projection 32 is incorporated on the base of the container 1 as activating member on which the bottom of the pressure medium container 9 bears when fixing the closure assembly 9 to the top container wall. As a result the valve 12 is pushed against the piston 19 of the pressure regulating element and the pressure medium container 9 is activated by opening the delivery valve 12.

The container 9 can contain (sic) an aerosol container known per se with a spring-loaded shut-off valve 12 that can be opened by pushing in. The pressure medium container can contain active carbon and CO_2 as described in NL-A 1012922 in the name of the Applicant. The capacity of the container can be between 1 and 50 litres and in a preferred embodiment is between 3 and 5 litres.

Fig. 2 shows the closure assembly 7 and shows a housing 35 of the pressure regulating element 10 in which the piston 19 is able to move up and down in a sealed manner along the inner cylindrical peripheral wall 36 of the housing 35. The valve 12 of the pressure medium container 9 is accommodated in a lower housing part 37, one edge of which bears on the upper shoulder 38 of the container 9. In an upper housing part 39, which is delimited by the cylindrical peripheral wall 36 and an end wall 40, there is a spring element 41 for applying a predetermined pressure to the valve 12 via the piston 19. The lower housing part 37 is in communication with the space 17 above the beer in the container 1 via the opening 21. The upper housing part 39 is in communication with the surroundings via the small throttle opening 24, so that ambient pressure prevails here as equilibrium pressure. In the event of variations in the internal pressure in the lower housing part 37 of the pressure regulating element 10 – such as a rise as a result of an increase in temperature or a fall as a consequence of enlargement of the volume of the space 17 above

the beer as a consequence of dispensing beer from the container – the piston 19 will move to restore a fixed pressure difference in the space 17 with respect to the atmosphere.

Furthermore, Fig. 2 shows the drink dispensing opening 13 incorporated in the closure assembly, which opening is closed off by the valve 11, which in the closed position thereof is pressed against the seat of the valve under spring pressure of spring 44. The top end of the riser 30 is connected to the closure assembly 7.

As can be seen from Fig. 2, the closure assembly 7 is connected via a resilient locking catch 42 to a flanged edge of the lid of the container 9. In this way the plastic closure assembly 7 can be assembled rapidly with the container 9 before being connected to the fill opening 5 of the container 1 via screw thread 43 after filling the container with drink via this fill opening 5. When the drink has been dispensed from the container 1 and the pressure medium from the container 9 has been at least partially consumed, the container 1 can be returned to the manufacturer, where the assembled unit of closure assembly 7 and pressure medium container 9 can be removed from the container 1 using a special tool, as shown in Fig. 4. After cleaning the container 1, a new closure assembly with a full pressure medium container connected thereto can be fitted in the container 1 refilled with drink, in order to close off the fill opening 5.

Fig. 3 shows an embodiment in which the pressure regulating element 10 can be set by the user in order to obtain a desired pressure in the space 17 above the beer. To this end the pressure regulating element 10 has a cap 45 that forms the end wall 40 of the upper housing part 39. The cap 45 is connected by screw thread 46 to the cylindrical peripheral wall of the housing 35 and by tightening can increase the spring pressure on the piston 19, so that the valve 12 is pushed in further and more pressure medium is delivered from the container 9, as a result of which the pressure increases correspondingly.

Fig. 4 shows an embodiment of a tool 50 by means of which the closure assembly 7, connected to the pressure medium container 9, can be fixed in fill opening 5 of the filled container and can be removed from the empty container. The tool 50 has a support plate 52 mounted on a rotary shaft 51. The support plate has an accommodating cavity 53 for engaging on the pressure regulating element 10 and a projection 54 that drops into the drink dispensing opening 13. Accurate positioning with respect to the pressure regulation assembly 7 is obtained by means of the accommodating cavity 10 and projection 54 and a moment can be exerted on this assembly for fixing or for releasing the screw thread 43.

Fig. 5 shows a further embodiment of a container 1, where the distance D1 of the drink dispensing opening 13 from the axis 29 of the container 1 is such that a horizontal portion 55 of the dispensing line 27 protrudes a distance D2 beyond the axis 29, which distance D2 is less than the diameter of the of the (sic) container 1, so that in the storage/transport position shown the dispensing line 27 does not protrude with respect to the container and is thus protected against mechanical damage. In the position indicated by a broken line in Fig. 5 the dispensing line 27 extends beyond the periphery of the container because the radial distance D3 from the fill opening 13 to the periphery of the container 1 is less than the distance D2 in Fig. 5. By turning the dispensing line 27 about the vertical line section 56, which is accommodated in the drink dispensing opening such that it can be turned, the dispensing line can be placed in the dispensing position shown by the broken line. The container 1 in Fig. 5 and the dispensing line 27 can, for example, be constructed as has been described in NL-A 1012922 in the name of the Applicant.